



# Effect of Mother Tree and Seed Provenance on Seed Germination of *Cassia fistula* L.

## Abstract

Forest restoration is vital for conserving ecosystems and biodiversity. In many regions, reforestation with seedlings is a common practice, often using seeds from local tree species that are likely adapted to the environment. However, climate change may alter environmental conditions, necessitating the consideration of seeds from other regions. This study aims to investigate the effects of seed provenance and mother trees on the germination of *Cassia fistula* L. to support seedling production. The research examines how various seed sources influence germination rates by utilizing seeds collected from the northern, southern, northeastern, and central regions of Thailand. Seed germination was tested in a controlled plant growth chamber set at a constant temperature of 25°C and a relative humidity of 70%. Germination data were recorded every two days until all seeds had germinated. The results indicated that the average germination rates were different seed sources, showing no significant differences. Additionally, the study assesses the effect of mother trees on germination rates. Fruits were collected from ten *Cassia fistula* L. mother trees, with their Girth at Breast Height (GBH) and tree height measurements. The seeds were cleaned and evaluated for germination in the growth chamber. This part of the study remains ongoing.

## Introduction

Currently, the issue of forest area loss in Thailand is widespread, making restoration necessary. Reforestation using seedlings is a common practice for forest ecosystem restoration, using seeds from local trees that are adapted to the environment of each area are normally used for seedling production. However, the environment today is impacted by global warming, making the use of seeds from other regions another alternative in the future. This study aims to investigate the effects of seed origin and maternal trees on the germination rate of *Cassia fistula* L. seeds to support seedling production.

## Methods

**Experiment 1: The Effect of seed provenance on germination rate.**

### Seed Collection

The seeds of the Golden Shower tree (*Cassia fistula* L.) were collected from four provinces: Lamphun, Surat Thani, Uthai Thani, Khon Kaen. They were applied in germination test.



### Germination Test

To study the effect of seed provenance on the germination rate, the seeds were tested using the following steps:

1. The seed coat was clipped, as *Cassia fistula* seeds have a thick seed coat.
2. The seeds were soaked in water for 1–2 hours.
3. The seeds were arranged in plastic containers lined with two layers of gauze. The experiment was repeated three times, with 100 seeds per trial.
4. The containers were placed in a growth chamber maintained at a constant temperature of 25°C and 70% relative humidity. Germination was observed and recorded every two days until all seeds had germinated.

**Experiment 2 : The Effect of mother tree on germination rate.**

### Seed Collection

Seeds were collected from 8 trees at Chiang Mai University, with 10 pods collected from each tree.

### Morphological Study

The study involved measuring the height of the mother tree were recorded. The length of the pods and diameter

## References

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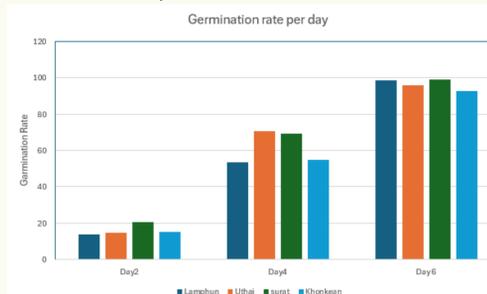
## Results

**Experiment 1: The Effect of Seed provenance on Germination Rate.**

Table 1. showing the average germination rate

Location	Germinations Rate(+SD)
Lamphun	98.33±1.699673
Uthai Thani	95.67±6.128259
Surat Thani	99±0.816497
Khon Kean	92.67±5.734884

Graph 1. The germination rate of *cassia fistula* L. from different provenance



The germination rates of seeds from Lamphun, Uthai Thani, Surat Thani, and Khon Kaen were not significantly different. From the experiment, Medium Length of Dormancy (MLD) values for Lamphun, Uthai Thani, Surat Thani, and Khon Kaen are 0.669, 0.678, 0.553, and 0.610, respectively.

**Experiment 2: The Effect of Mother Tree on Germination Rate.**

Mother tree	Stem Size		Pod Size (in diameter)	
	GBH (inch)	Height (in meters)	Pod	Pod Length
1	15.2	3	0.72	16.74
2	18.3	3.5	0.62	15.27
3	22.1	3	0.69	15.33
4	27.2	4	0.73	15.64
5	27	5	0.49	14.34
6	32.5	5	0.57	16.58
7	42	7	0.79	16.12
8	24.45	2.5	0.81	14.67

Table 2. Morphological Data and Pod of the mother tree

## Discussion

The results of this study indicate that the seed origin had no significant effect on the germination rate. The average germination rates from different sources were similar, and statistical analysis using the SPSS program revealed no significant differences between groups. This suggests that seeds from different sources may have similar germination potential or that germination potential is independent of seed origin. Seeds may exhibit comparable germination potential regardless of their origin (Baskin & Baskin, 2014). If the seed sources share similar environmental conditions, such as temperature, soil composition, and humidity, the seeds may develop under comparable conditions, leading to similar germination responses (Donohue et al., 2010). Additionally, storing seeds under appropriate conditions before testing may help minimize the impact of origin-related variations, maintaining consistent germination potential (Probert et al., 2009). Furthermore, other factors, such as seed viability, seed age, and seed preparation methods before planting, may have a greater influence on the germination rate than seed origin (Bewley et al., 2013).

## Conclusion

The study on the source of seeds of *Cassia fistula* L. found that there was no significant effect on the germination rate, meaning that the seeds can be used for propagation without concern for differences in germination rates. This research may be useful for future seedling production. However, further studies should be conducted on growth development, seedling strength in later stages, and the germination rate at different temperatures to obtain comprehensive data for more effective utilization.